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THE PLANT DISEASE REPORTER

Issued By

Division of Mycology and Disease Survey

BUREAU OF PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

Volume XXV Number 6

April 1, 1941

The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations, and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.

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RELATIVE PREVALENCE AND GEOGRAPHIC DISTRIBUTION OF VARIOUS EAR ROT FUNGI IN THE 1940 CORN CROP 1/

P. E. Hoppe 2/

The results of the eighth of a series of annual surveys of the relative prevalence and geographic distribution of ear and kernel rot fungi found in that portion of the crop reaching the terminal markets, are given in this report. The results of the previous surveys have been reported annually (PDR 18: 186-189, 19: 26-30, 20: 312-316, 21: 222-224, 23: 142-148, and 24: 210-213). These surveys have been made possible through the active cooperation of the Grain and Seed Division, Agricultural Marketing Service, and grain inspectors licensed under the United States Grain Standards Act. Samples containing the sound and the commercially damaged separates from carload lots of corn of known origin are sent to the Chicago office by the inspectors for review, after which they are sent to the writer. The kernels in the damaged separates then are plated to identify the fungi associated with the damaged kernels. The kernels are first surface-sterilized by immersion for 10 to 12 minutes in a 10 percent solution of the commercial product "B. K." (3.5 percent sodium hypochlorite) after which they are plated on slightly acidified potato dextrose agar, incubated for 4 days at room temperatures, and then the organisms are identified.

Considerable Ear Rot in the 1940 Corn Crop

Evidence from a number of sources indicates that ear rot diseases in the 1940 corn crop were generally more abundant than in recent years. This definitely was the situation in southern Wisconsin where the writer had occasion to visit many fields at harvest time and found considerably more than the usual amounts of both Gibberella and Diplodia ear rots. That this situation was wide-spread and extended into neighboring States is indicated in the quality of subsequent market shipments from the Corn Belt States. Data recently released by the Agricultural Marketing Service (December 27, 1940) on inspections at representative markets show very materially lower market grades than for the corresponding period in 1939. That these differences are due to a considerable extent to increases over 1939 in "total damage" (generally recognized as largely the result of ear and kernel rot diseases), rather than to any great differences in moisture content of the two crops, appears likely since both crops matured about equally well, and the moisture contents should have been nearly the same. The percentages "total damage"in the 1940 samples which the writer received for the plating studies ran considerably higher for all Corn Belt States than those received from these areas in 1939. In contrast, samples from along the Atlantic Seaboard ran lower in "total

1/ Survey conducted by the Grain and Seed Division, Agricultural Marketing Service, U. S. Department of Agriculture, the Wisconsin Agricultural Experiment Station, and the Division of Cereal Crops and Diseases, Bureau of Plant Industry, U. S. Department of Agriculture.

2/Associate Pathologist, Division of Cereal Crops and Diseases, Bureau of Plant Industry, U. S. Department of Agriculture.

Table 1. Average percentages, by states and regions, of fungi recovered in plating damaged kernels from samples obtained from carload lots of corn arriving at terminal markets (1940 crop).

Origin of samples	Number carloads sampled	Total damage	Sound kernels	Diplodia zeae	Gibberella saubinetti	Fusarium moniliforme	Other fusaria	Nigrospora sphaerica	Mucors	Penicillium spp.	Aspergillus spp.	Sterile kernels	Miscellaneous	Unidentified 1/
Atlantic Seaboard States:														
Md.	27	4.5	0.3	18.5	18.4	20.1	0.1	0.3	2.7	3.7	0.	0.9	23.7	11.3
Del.	7	5.0	.4	7.5	33.8	7.4	1.7	1.0	3.9	1.2	0	7.3	29.8	6.0
Average	34	4.6	.4	16.2	21.6	17.5	.5	0.4	2.9	3.2	0	2.2	24.9	10.2
Southern States:														
Ky.	4	2.4	0	40.9	0	59.1	0	0	0	0	0	0	0	
Tenn.	29	2.9	0.7	43.2	1.3	49.1	0.4	0	1.1	0.5	0	0.9	2.8	
Average	33	2.8	0.7-	42.9	1.1	50.3	0.3-	0	1.0	0.4	0	0.8-	2.5	
East-Central States:														
Ohio	10	3.2	0.2	36.4	6.3	12.8	0	0.6	4.3	3.7	0	8.1	27.6	0
Ind.	9	3.4	1.5	58.4	1.9	11.3	0.5	0	4.0	5.1	0.2	3.1	13.5	0.5
Ill.	103	3.9	0.6	68.3	2.1	14.8	0.4	0.3	2.6	2.6	0.1	1.7	6.4	0.1
Mich.	1	2.0	0	18.2	22.7	4.5	0	0	9.1	0	0	0	45.5	0
Average	123	3.8	0.7	64.6	2.6-	14.3	0.4-	0.3-	2.9	2.9	0.1	2.3+	8.8	0.1
West-Central States:														
Minn.	2	7.1	0	41.6	6.3	7.1	0	0	2.0	15.0	0	0	28.0	0
Iowa	132	4.3	0.4	63.8	12.1	15.6	0.4	0.4	1.8	0.8	0.1	0.9	3.7	0
Mo.	39	3.2	0.5	36.5	0.6	48.1	0.3	0	5.9	1.6	0.3	1.3	4.9	0
Average	173	4.1	0.4	57.4-	9.5-	22.8	0.3	0.3	2.7	1.2-	0.1	1.0-	4.3-	0
South-Western States:														
Ark.	2	3.6	0	44.1	0	48.3	0	0	3.8	0	0	1.0	2.8	
Okla.	3	4.6	1.6	19.4	0	59.2	0	0	5.2	0	1.7	0.9	11.2	0.8
Texas	16	3.7	0.9	23.4	0	52.9	0.2	0	4.4	0.6	1.8	1.7	9.1	
Average	21	3.8	0.9	28.6-	0	53.3	0.2	0	4.4	0.5-	1.6	1.5	8.9	0.1
Western States:														
Neb.	9	3.3	0.5	6.5	0.4	73.4	0.3	0	10.7	4.1	0	0	4.1	
Kans.	24	3.8	0.2	7.0	0.2	75.1	0	0.3	7.9	1.4	1.4	0.9	5.6	
Colo.	4	3.4	.7			49.8			4.7	1.6	.7	12.6	29.9	
Average	37	3.6	.3	6.1	0.2	72.0	0.1	0.1	8.2	2.1	1.0	1.9	7.9	

1/ A fungus always found in eastern samples and occasionally in those from the Middle West. Its pathogenicity as a stalk and ear rot fungus has been demonstrated by the writer in artificial inoculation experiments.

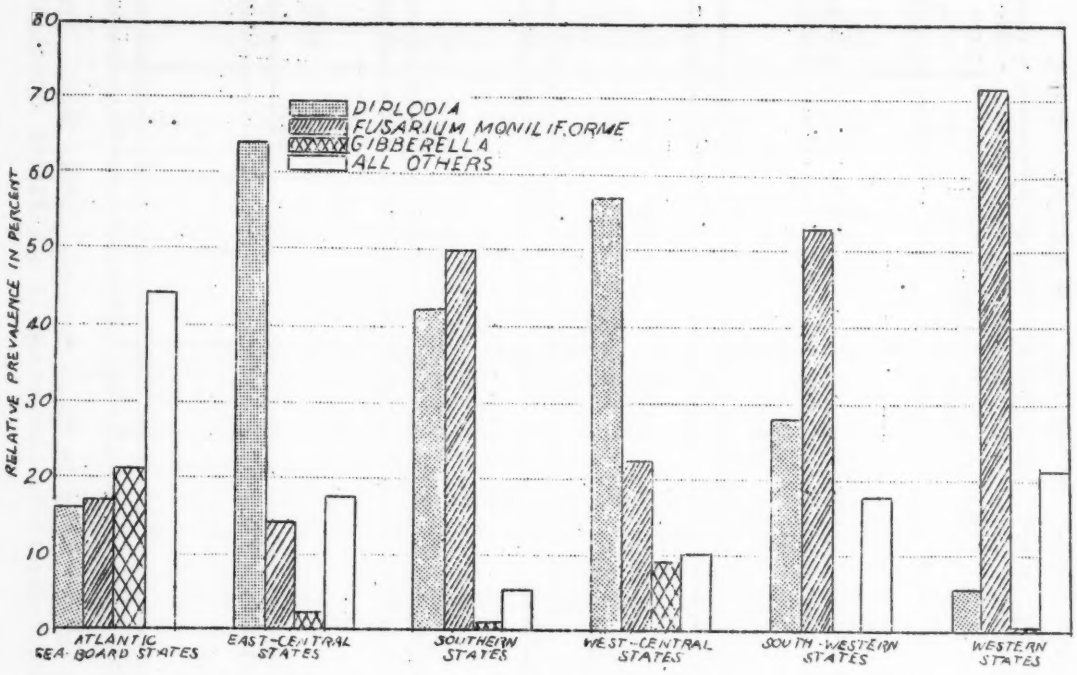

Figure 1. Relative prevalence of Diplodia (D. zeae and D. macrospora), Gibberella saubinetii, Fusarium moniliforme, and a group which includes all other fungi, bacteria, sterile kernels, etc. in the 1940 crop for 6 general geographic regions, as indicated by platings of the damaged kernels in samples obtained from carload lots of corn arriving at terminal markets from the regions indicated. (From data in Table 1).

damage" in 1940 than in 1939. This, coupled with plating evidence, indicates a lower incidence of ear rot diseases in the field in the Seaboard States in 1940 than in 1939.

Results of 1940 Survey

A total of 421 samples were plated in the 1940 survey. This is a much larger number than has been received in any of the previous surveys. The samples were mostly from market receipts during December, 1940, and January, 1941. The results for the 1940 survey are summarized for States and Geographic regions in table 1, and are presented graphically in figure 1. A brief discussion of the results follows:

Atlantic Seaboard States (Maryland and Delaware): The platings from this coastal area differed sharply from the results obtained here in the previous surveys. "Total damage" percentages were lower, the relative prevalence of miscellaneous fungi was considerably higher, and the incidence of Diplodia was much lower in 1940 than in any of the previous surveys. In the past Diplodia always has been the leading fungus recovered from the damaged kernels and in none of the previous surveys has the

incidence of this ear rot fungus fallen below 30 percent. In 1940, however, Diplodia accounted for only 16.2 percent of the damaged grain and fell behind both Gibberella and Fusarium moniliforme in relative prevalence. Gibberella, with 21.6 percent, and F. moniliforme with 17.5 percent, were the ranking fungi in the 1940 Seaboard States samples. This is an all-time high in these surveys for Gibberella in this area. The incidence of F. moniliforme was about average in 1940. A certain unidentified fungus, always found in damaged grain samples from the Seaboard States, was plated from 10.2 percent of the damaged grain in 1940. This is higher than usual for this fungus.

Southern States (Kentucky and Tennessee): The results for this region ran true to form and F. moniliforme and Diplodia accounted for practically all the 1940 damage. The percentages for these fungi were 50.3 and 42.9, respectively. The rare occurrence of Gibberella in southern samples always has been characteristic. D. macrospora again was recovered from the southern samples, the ratio of D. macrospora to D. zeae roughly was 1 to 19.

East-Central States (Ohio, Indiana, Illinois, and Mighigan): Diplodia was overwhelmingly the leading fungus in the samples from this area, especially in Illinois and Indiana. Approximately 65 percent of the damaged kernels from these 2 States plated Diplodia. Diplodia fell off to 36.4 percent in Ohio samples but even so was the most prevalent of the various rot fungi. Only 1 sample was obtained from Michigan and therefore little can be said about the situation in this State. Fusarium moniliforme ranked a poor second in the East-Central States and accounted for only 14.3 percent of the damaged grain. While Gibberella averaged only 2.6 percent for the East-Central region, it was noted that samples from northern Illinois frequently plated up to 10 percent Gibberella. This is interesting in view of the fact that Gibberella ear rot occurred in epidemic form throughout southern Wisconsin and was very common throughout most of Iowa.

West-Central States (Minnesota, Iowa, and Missouri): These states are not a natural grouping from the standpoint of a similarity in types and kinds of ear rots, and average percentages for the region as a whole are misleading when applied to any one of the States. The heavy incidence of Diplodia noted in Illinois samples carried over throughout most of Iowa and 63.8 percent of the damaged kernels from this State plated Diplodia. Iowa samples plated 15.6 percent Fusarium moniliforme and 12.1 percent Gibberella. The latter figure represents the highest incidence of Gibberella in an important Corn Belt State since these surveys were begun. Missouri samples were characterized by much higher percentages of F. moniliforme and less Diplodia than in Iowa, the figures being 48.1 and 36.5, respectively. Not enough samples were obtained from Minnesota in 1940 for any definite statements for this State.

South-Western States (Arkansas, Oklahoma, and Texas): Approximately 80 percent of the damaged kernels from this area plated either Fusarium moniliforme or Diplodia, with the former about twice as prevalent as the latter. No cultures of either Gibberella or Nigrospora were obtained from any of the 21 samples from this region.

Western States (Kansas, Nebraska, Colorado): This area has shown less inter-annual fluctuation in the relative prevalence of the rot fungi than any of the other geographic regions. As has been the case in all former surveys, Fusarium moniliforme in 1940 was easily the leading fungus with over 70 percent of the damaged kernels plating this fungus. The Western samples plated 6.1 percent Diplodia which is higher than average for this area. The conditions favorable for the development of Diplodia ear rot which prevailed throughout most of the Corn Belt in 1940 apparently extended, to a lesser degree, into Kansas and Nebraska, but not into Colorado.

INCIDENCE OF BACTERIAL WILT OF SWEET CORN, 1935-1940: FORECASTS AND PERFORMANCE

N. E. Stevens and C. M. Haenseler

Experimental forecasts of the probable incidence of bacterial wilt [Phytomonas stewarti] of sweet corn in the eastern United States have now been issued for six years, 1935-1940. These forecasts, which were based on the mean temperatures of the preceeding winter months, were made to test the validity as well as the practical usefulness of a hypothesis advanced in October, 1934 (P. D. R. 18:141-149) that there might be a correlation between winter temperatures and the incidence of bacterial wilt in the following summer.

It is now proposed to discontinue these forecasts, not because of failure, but because, as the following summary will show, the correlation has continued so close that such general forecasts can have little further interest unless or until some wholly exceptional season occurs. Moreover, pathologists in the States most interested are regularly making local forecasts for the use of growers in their own States. These are more useful and certainly more easily made than the general forecasts which, in order to be timely, must be based on information secured by letter from local weather observers throughout the area. Needless to say, these officials have been most courteous and helpful.

The period of the experiment has included two winters of unusual severity, 1935-1936 and 1939-1940, as well as a succession of three winters in which the mean temperatures were near or well above normal. The hypothesis on which the experiments were started was that this disease "will usually be absent in the northeastern United States following a winter with an index below 90 and present in destructive amounts following a winter with an index above 100, with intermediate conditions following winters between 90 and 100." The winter index here used is a simple sum of the mean temperatures for December, January, and February. The maps in Figure 1 show the approximate northern boundary for each of these years of the area with winter temperatures corresponding to an index of 100 or more. On the basis of these temperature conditions, forecasts were made as follows:

1935 - On the whole any considerable increase in the amount of the disease over last season is unlikely. (PDR 19:69).

Figure 1. Approximate northern boundaries indicated by dotted lines, of the areas with winter temperatures corresponding to an index of 100 or more, for each year during the period 1935 to 1940 inclusive.

1936 - On the basis of winter temperature indices alone, if the hypothesis now being tested is correct, one would expect some reduction in the amount of the disease along the southern portion of this area, and little change in the amount of disease in New York and New England. (PDR 20:110)

1937 - There should be an observable increase, as compared with last year, in the incidence of bacterial wilt on susceptible varieties of sweet corn in the area between northern Virginia and southern Connecticut. It is probable also that if corn planting conditions are comparable, the disease will appear somewhat earlier. Unless one or both of these conditions is fulfilled, the hypothesis will have to be abandoned or modified. (PDR 21:107).

1938 - On the basis of winter temperatures then, if the hypothesis now being tested is correct, there should be little change in the incidence of bacterial wilt as compared to last year in Ohio and Indiana, while commercially important losses should occur on susceptible varieties from northern Virginia to central New Jersey and possibly Long Island. Losses should be observably less than last year in Rockland County, New York, unless as previously suggested by one of the authors, the controlling influence of the slightly colder winter of 1937-38 may be counteracted by the fact that this was the second consecutive warm winter. Considering both winter temperature and possible accumulative effects, then, it seems very probable that the incidence of wilt in 1938 in the Eastern section may be very similar to that of 1937. (PDR 22:100).

1939 - On the basis of winter temperatures as indicated by a sum of monthly means then, if the hypothesis now being tested is correct, there should be at least as much bacterial wilt on susceptible varieties of sweet corn as last year, with commercially significant losses as far north as Rockland County, New York and Indianapolis, Indiana. Reference has been made several times to the probability that a series of warm winters may be more favorable to the disease than one very warm one (PDR 18: 147; 22: 100). The accumulated effect of the past three warm winters may well result in losses more serious than those of 1937 or 1938. (PDR 23:104).

1940 - On the basis of available information it seems safe to predict that on the eastern seaboard, commercially significant losses will not occur north of Maryland and central New Jersey, with the possible exception of such a locality as Bellmore on Long Island where the disease seems to persist locally every year.

In Ohio and Indiana there seems to be no reason to expect commercially significant losses on sweet corn, unless as suggested by several correspondents, the prevalence of the disease in field corn results in a very high carry-over of the pathogen. (PDR 24: 129).

The degree of accuracy with which these forecasts have been fulfilled may be traced in detail through the reports published each year

PDR 19: 286-288; 20: 248-254; 21: 298-305; 22: 96-100; 23: 99-102; 24: 122-124). Most of these were sent in by pathologists in the various States, though in the earlier years some special surveys were made. It would be useless to review here information so readily available but a summary of conditions in Rockland County (in the lower Hudson Valley), New York, will serve to illustrate the fluctuations of the disease. This is an important area in the production of sweet corn for the New York market. It is one of the "border-line" areas and the records are very complete. The summaries follow:

1935 - In Rockland County bacterial wilt was found in a few fields of susceptible varieties, though in very small amounts; usually the count was as low as 1/3 of 1 percent infected plants. (PDR 19: 287)

1936 - In the Hudson Valley, bacterial wilt was found as far north as Kingston, though there has been no commercial loss in this region since 1933. This year a number of fields of sweet corn were examined, chiefly those on farms which have been visited regularly for the past five years. Wilt was found in only one, which showed about 0.25 percent seriously diseased plants. (PDR 20: 250)

1937 - Rockland County: Bacterial wilt has been unusually prevalent on sweet corn in the market gardening areas of Rockland County during the 1937 growing season. Practically all growers report from 10 to 90 percent loss in one or more varieties.

The first manifestation of the disease was noted early in May by Niles M. Davies of Congers. From that time reports on the widespread prevalence of the wilt came into my office at New City, or I observed the same in my visits among the vegetable growers. In general the loss to the growers can be conservatively placed at 30 percent of the crop. Also it is the opinion of the market gardeners of this area that the wilt disease will take a larger toll in the late plantings than it did in the early ones. (William J. Clark, County Agricultural Agent. (PDR 21: 303)

1938 - The disease first appeared on June 16 and by July 1 was present throughout the County. In some fields there was only a trace, in others as high as 40 percent of the corn was infected. On August 1, Clark reported that although the disease in Rockland County started with a vengeance, for some reason or other it did not continue. (PDR 22: 241 and 337).

1939 - In Rockland County, W. J. Clark, who has followed the disease for several years, reported it as present in most fields, but generally less than in the previous 2 years. (PDR 23: 208)

Prevalence of Bacterial Wilt in 1940

In response to our requests for information pathologists in the various States have sent summaries of the incidence of bacterial wilt.

The following detailed reports from Chupp and Cannon regarding conditions on Long Island, New York, are of special significance in view of the previous persistence of the disease in certain localities there:

"I have just returned from Long Island where I examined a number of sweet corn fields. In one field of early Seneca 60 I saw a very large amount of corn wilt. This field was located near Cold Spring Harbor on the north shore of the Island." (Charles Chupp, June 14, 1940.)

"Earlier this season Dr. Chupp informed you that we had found bacterial wilt of corn in one of the early plantings near Woodbury, New York. About 10 percent of the plants in this field were severely infected with wilt; the remainder were uninfected. Inasmuch as this susceptible variety (Seneca 60) had been planted thicker than usual, the loss to the total planting was insignificant.

"It might also interest you to know that I found no commercial planting of corn in Nassau County during 1940, with the above exception, where the plants lost due to wilt exceeded 5 percent. At the present time, light infection can be found on most plants, but it is difficult to find a plant killed by Stewart's wilt disease. There was little difference in the amount of wilt in different parts of the county, this being the first time in years that it has not been serious near Bellmore." (Orson S. Cannon, September 17, 1940.)

For New York State as a whole, Charles Chupp sends this summary (January 10, 1941):

"Aside from the infection noted above there was only a trace found on Long Island and a few affected plants in Rockland County which is in the lower Hudson Valley. No other reports of the disease reached me this year. During the summer I visited nearly every county in the State where corn is grown extensively, and my observations verify the statements of the county agricultural agents and Fellowship men."

Bacterial wilt was of almost no commercial importance in New Jersey during 1940 except in a very few fields in the extreme southern and south central portions of the State. There were a few very unusual cases. At Leesburg in Cumberland County one field of Golden Cross Bantam, grown for canning, showed 40 percent infected plants on July 1 in the lower, dark soil portion of the field, with 60 percent infection in some smaller local spots. On the very slightly higher, lighter colored, more sandy end of the same field 15 percent infection occurred. This was the most severe case of wilt ever observed in Golden Cross Bantam. Adjacent fields planted with the same seed lot a few days later remained practically free from wilt. A variety test in the Moorestown area of Burlington County also showed 29 percent wilt-infected plants on June 28 on the most susceptible variety, while on a duplicate test on light sandy soil at Beverly in the same county, only a trace of wilt occurred. In both of the severe wilt cases flea beetles were abundant early in the season whereas beetles were very scarce in the wilt-free areas.

For Pennsylvania R. S. Kirby estimates an average loss from bacterial wilt on sweet corn of about 0. 5 percent but suggests that it might well have been higher if susceptible varieties had been used.

That the disease was prevalent south of Pennsylvania is indicated by the following notes sent by R. A. Jehle on January 21, 1941 regarding conditions in Maryland:

"During the summer I was called to Harford and Cecil Counties to investigate trouble in Golden Bantam sweet corn fields. In three fields in Harford County 50 to 60 percent of the plants were severely infected with wilt and in another field in Cecil County, 35 percent of the plants were severely infected."

Roy C. Thomas reports as follows for Ohio:

"Stewart's disease was of no economic importance in Ohio during the season of 1940. It was only with persistent search that traces of the disease could be found in any part of the State throughout the season. It seemed resonable to assume that the first random traces that appeared arose from seed infection. Furthermore, there was very little spread of the disease. One very susceptible field-corn inbred, which is sometimes used as an indicator of the severity of Stewart's disease, last year showed only 2 percent infection, whereas in 1939 the same inbred showed 95 percent."

During a recent personal conversation Glenn M. Smith informed us that conditions in Indiana were much like those in adjacent States, with no reports of the disease from growers, and small losses in experimental plots.

Benjamin Koehler's records for Illinois include only notes on field corn but indicate that bacterial wilt was certainly not common:

"In June 1940 a few young corn plants of an inbred from flour corn showed typical symptoms of Stewart's disease on the Agronomy South Farm. None was observed on any other corn on the South Farm, nor was any observed on the Brownstown Experiment Field in Fayette County. Aside from those places I did not look closely and none was reported. In September, small but typical leaf symptoms of Stewart's disease were found on occasional plants of hybrid corn in a number of the experimental fields."

As already noted, our forecast for 1940 was that there would be no commercially significant losses on sweet corn north of central New Jersey with the possible exception of such localities as Bellmore, Long Island, and probably none in Ohio and Indiana. The reports summarized above indicate that we were too cautious, for commercially significant losses did not occur even at Bellmore.

(University of Illinois and New Jersey State College of Agriculture and Mechanic Arts.)

CEREAL RUSTS IN THE GREAT PLAINS AND THE FAR WEST

KANSAS AND SOUTHERN PLAINS STATES

There is an unusually large amount of overwintering of leaf rust [Puccinia rubigo-vera tritici] of wheat throughout the southern and central plains area this year. A small amount of leaf rust has been found in the vicinity of Manhattan throughout the winter. The latest collection was made on February 17. Thus far, however, there has been no increase in the amount of rust. Recent reports indicate that leaf rust is beginning to increase in central Oklahoma. At the present moment it looks as though the stage is set for an early and heavy infection of leaf rust in 1941.

The stem-rust [P. graminis] situation is very different. The heavy infection of stem rust last fall disappeared rapidly during December and January. Recently the writer has been unable to find stem-rust uredia on live leaves. Spores from old uredia on dead leaves collected early in January failed to germinate. Leaf rust collected the same day germinated well and gave excellent infection.

Samples and reports of leaf rust of wheat and crown rust [P. coronata] of oats have been received from the San Antonio area in Texas but no stem rust collections or reports have been received thus far. (C. O. Johnston, Cereal Courier 33: 21. Mar. 10, 1941).

CALIFORNIA

Leaf and stem rusts on wheat and crown and stem rusts on oats, which overwintered locally on early germinating volunteer plants, are beginning to spread. Stem rust also overwintered on some of Sando's perennials. At this stage it looks like 1941 will be another bad rust year in California. (C. A. Suneson, Cereal Courier 33:24. Mar. 10, 1941.)

TOMATO DISEASES IN NEW JERSEY IN 1939 AND 1940

Edward K. Vaughan

During the last two growing seasons extensive observations have been made of tomato diseases in New Jersey. Approximately 150 fields in all sections of the State where can-house tomatoes are grown were visited in 1939 and approximately 125 fields in 1940, most of them several times during the season. With the exception of early blight and fusarium wilt there were only slight differences in the diseases during the two seasons.

Early Blight, Collar Rot (caused by Alternaria solani). The beginning of the tomato growing season of 1939 was marked by an unusually severe outbreak of collar rot. Some southern grown plants had visible cankers when they were received by the growers, but in the majority of

cases the growers reported that the plants were apparently healthy on arrival and that the disease developed soon after setting. Losses in fields planted with southern plants ranged from 1 or 2 percent to as high as 95 percent of the plants, the average losses in all fields examined being approximately 20 percent. Losses in fields of locally grown plants were negligible.

The unusual severity of the disease can probably be attributed to a number of factors both in the plant bed and in the field. Because of the warm weather and heavy rains in the South many of the plants shipped were very succulent and larger than usual. When the plants reached New Jersey they were set in very dry soil and were blasted by drying winds for several days. As a result they wilted badly and did not make appreciable growth for a considerable period of time. It was during this period of adverse environmental conditions and enforced inactivity that the plants were so severely attacked.

Later in the season, after the first fruits had matured, infection on the leaves and stems was common throughout the State although the losses due to the late infection were slight.

The beginning of the tomato growing season of 1940 was marked by an almost complete absence of any disease. Southern grown plants arrived in excellent condition with only an occasional small leaf spot or stem canker. Most soils contained abundant moisture so that the plants did not wilt badly and were able to start active growth very promptly after being set out. The only serious collar rot infection observed occurred in 2 fields of seedlings in Camden County where approximately 60 percent of the plants were severely affected.

In almost all fields alternaria infection was present throughout the season on the older leaves in the center of the plants, but did not cause appreciable damage until after the fruit picking season was well advanced. No case of severe defoliation definitely caused by early blight was observed at any time during the season.

Southern Sclerotium Blight (caused by Sclerotium rolfsii). Each spring this disease causes complete destruction of a small number of baskets of southern plants. However, the plants are destroyed so rapidly that none of them are set out.

Bacterial Wilt (caused by Bacterium [Phytomonas] solanacearum). Wilt was present in low parts of many fields but only a few fields were severely damaged by this disease. In most cases the plants in affected fields were shipped from the South, but in at least one field which was severely affected in 1939 the plants were locally grown.

Bacterial Canker (caused by Aplanobacter michiganense [Phytomonas michiganensis]). Canker caused severe losses in 3 or 4 fields each season. In all but one questionable case the plants were home grown and no precautions had been taken to prevent disease development.

Fusarium Wilt (caused by Fusarium bulbigenum var. lycopersici). In 1939 this disease was present in comparatively few fields and did not cause appreciable losses even in fields planted with such susceptible varieties as Bonny Best. In 1940, on the other hand, fusarium wilt

probably caused greater damage than any other infectious disease. While certain sections of the State were practically free from the disease, in other sections, particularly near Rancocas, Swedesboro, and Bridgeport many fields were severely damaged. Several fields were visited where 100 percent of the plants were severely affected by August 1.

Leaf Spot (caused by Septoria lycopersici) In 1939 leaf spot was reported from only one field and did not cause any damage. In 1940 the disease was present in most fields in the southern part of the tomato growing section of the State after August 1. While some damage was caused, no case of severe defoliation was observed and no instance of severe damage was reported.

Anthracnose (caused by Colletotrichum phomoides). Although anthracnose caused some damage in all fields the losses during the two seasons were about average. In 1940 very little anthracnose was seen until after September 1, although the disease was present to some extent in all fields. After the heavy rains in late August and the storm on September 1 the disease caused considerable damage.

Buckeye Rot (caused by Phytophthora parasitica). In 1939 this disease was seen in 3 fields. In each case almost all of the fruit was ruined.

Phytophthora Rot (caused by Phytophthora spp.) Late in both seasons a few cases of phytophthora rot were reported in tomato fruit picked green and stored for ripening. The decay progressed very rapidly and caused almost 100 percent loss of the fruit.

Virus Diseases were present in practically all fields and were most prevalent in fields set with locally grown greenhouse or hotbed plants. Although most fields were affected by tomato mosaic several cases of yellow tobacco mosaic were also seen and in 1940 at least one large field was severely damaged by combination virus streak.

Cloudy Spot, similar to the disease which in other states has been attributed to the feeding of stink bugs and perhaps other insects was more prevalent in 1940 than in the previous two seasons.

Weather Conditions. In 1940 much greater damage to the tomato crop was caused by unfavorable weather conditions than by infectious diseases. During June and early July the plants grew very rapidly and produced such an abundance of succulent tissues that during the hot dry weather of the latter part of July and early August severe burning occurred. As the leaves dropped off the clusters of fruit were exposed to direct sunlight and sunscald resulted. Probably as much as 12 to 15 percent of the crop was ruined by sunscald and by the secondary fungi which gained entrance to the fruit through the scald lesions.

Following a week of rainy weather, which culminated on September 1 in a cloudburst with 8 to 10 inches of rainfall in much of the tomato

growing area, many fruits were damaged by cracking and by various fungi that gained entrance through the cracks. In some sections as much as 3 to 4 tons of fruit per acre were lost, and the grade of almost all fruit marketed during the next 10 or 12 days was considerably reduced.

(Conducted as a phase of cooperative investigations between the Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry, U. S. Department of Agriculture, the New Jersey Agricultural Experiment Station, the Department of Botany of the Indiana Agricultural Experiment Station, the Georgia Coastal Plain Experiment Station, the Georgia Agricultural Experiment Station, and the Georgia Department of Entomology.)

CHECK LIST REVISION

Freeman Weiss

ELAEIS (PALMACEAE)

ELAEIS spp. Several spp. of feather palms of tropical America and Africa, of which E. GUINEENSIS Jacq., AFRICAN OIL PALM, is sometimes grown as an ornamental in S. Fla. and the West Indies.

Achorella attaleae F. L. Stevens, leaf spot. Canal Zone.
Meliola melanococcae F. L. Stevens, black mildew. Canal Zone.

EUCALYPTUS (MYRTACEAE)

EUCALYPTUS spp., GUM-TREE. Evergreen trees or shrubs mostly native in Australia, of which numerous species have been introduced since 1860 into N. America, chiefly Calif., and also Mexico, Central America, the West Indies and the Hawaiian Islands. The principal sp. cult. in Calif. is E. GLOBULUS Labill., BLUE GUM; others are E. BOTRYOIDES Sm., BANGALAY; E. MACULATA Hook., SPOTTED GUM, and its var. CITRIODORA Hook., LEMON GUM; E. CORYNOCALYX F. Muell; SUGAR GUM; E. FICIFOLIA F. Muell., SCARLET GUM; E. LEUCOXYLON F. Muell., IRONBARK; E. RESINIFERA Sm., MAHOGANY GUM; E. RUDIS Endl., DESERT GUM; E. VIMINALIS Hook., MANNA GUM. All the following records are from Calif. unless otherwise stated.

Bagnisiopsis eucalypti Dearn. & Barth., on twigs.
Botryosphaeria ribis Gross. & Dug. (also var. chromogena Shear et al), on branches & trunks. Fla., T. H.
Botrytis cinerea Pers. and B. fusca (Cke. & Harkn.) Sacc., on twigs
Ceratostomella echinella Ell. & Ev.
Clitocybe tabescens (Scop. ex Fr.) Bres., mushroom root rot. Fla.

EUCALYPTUS--Continued

Coremium glaucum Lk., on leaves.
Corticium epiphyllum Pers. ex Cke., on leaves.
Cryptosporium eucalypti Cke. & Harkn., on branches. (C. ceuthosporioides Cke. & Harkn.): Septoria ceuthosporoides.
(Dermatea eucalypti Cke. & Harkn.): Scleroderris eucalypti.
Didymosphaeria epidermidis Fr., on branches.
Diplodia eucalypti Cke. & Harkn. and D. tenuis Cke. & Harkn., on branches; D. microspora Sacc., on leaves.
Fomes robustus Karst., on trunks.
Gloeosporium capsularum Cke. & Harkn., on fruits.
Hendersonia corynecidea Cke. & Harkn., on branches; H. eucalypti Cke. & Harkn. and H. eucalypticola A. R. Davis, on leaves.
Heterosporium eucalypti Ell. & Ev., on leaves.
Hypocrea consimilis Ell., on twigs.
Hypoderma eucalypti Cke. & Harkn., on leaves.
Melanconium globosum Cke. & Harkn., on branches.
Monochaetia desmazierii Sacc.
Nectria eucalypti (Cke. & Harkn.) Berl. & Vogl., on branches.
Pestalotia (Pestalozzia) inquinans Cke. & Harkn., on leaves. (P. monochaeta Desm.): Monochaetia desmazierii
Phragmodothidea eucalypti Dearn. & Barth., on bark of dead stems.
Phyllosticta extensa Sacc. & Syd. (P. eucalypti Ell. & Ev.), leaf spot.
Physalospora latitans Sacc., on leaves & twigs.
Phytomonas tumefaciens (EFS.) Bergey, crown gall.
Scleroderris eucalypti (Cke. & Harkn.) Sacc., on branches.
Septobasidium curtisii (Berk. & Desm.) Boed. & Stein, felt fungus. N. Car.
Septoria ceuthosporioides (Cke.) Sacc., and S. mortolensis Penz. & Sacc., on leaves.
Septosporium scyphophorum Cke. & Harkn., on leaves.
Sphaeronema eucalypti Cke. & Harkn., on branches
Sphaeropsis macrospermum Cke. & Harkn. and S. stictoides Earle, on leaves.
Valsaria eucalypti (Kalchbr. & Cke.) Sacc., on twigs.
Volutella coronata Cke. & Harkn., on twigs.

EUCALYPTUS GLOBULUS Labill., BLUE GUM.

Cryptosporium eucalypti Cke. & Harkn., on branches.
Diaporthe medusaea Nit. (D. eucalypti Harkn.), on twigs and ?leaves.
Didymosphaeria circinnans Harkn., on leaves.
Diplodia australiae Speg., on bark
Fomes applanatus (Pers. ex Fr.) Gill., heart rot. Calif., T. H.
Harknessia uromycoides (Speg.) Cke., on leaves & twigs.
Hendersonia eucalypticola A. R. Davis, on leaves.
Macrophoma molleriana (Thuem.) Berl. & Vogl., on leaves.
Monochaetia desmazierii Sacc., on leaves.
Mycosphaerella molleriana (Thuem.) Lindau, leaf spot.
Pestalotia truncata Lév., on leaves.
Pezizella carneo-rosea Sacc., on twigs. P. oenotherae (Cke. & Ell.) Sacc., on leaves (conidial & pycnidial stages).

EUCALYPTUS--Continued

Phyllosticta extensa Sacc. & Syd., on leaves.
Physalospora latitans Sacc., on leaves & twigs. Calif., Fla.
P. suberumpens Ell. & Ev., on bark.
P. rhodina (Berk & Curt.) Cke., on branches. Ga.
Polyporus gilvus (Schw.) Fr., P. hirsutus Wulf. ex Fr., and P. versicolor L. ex Fr., wood rot. Calif. P. vellereus Berk., T. H.
P. schweinitzii Fr. and P. sulphureus Bull. ex Fr., butt rot, root rot.
Septonema multiplex Berk. & Curt., on trunks
Septosporium scyphophorum Cke. & Harkn., on leaves.
Stereum hirsutum Willd. ex Fr., wood rot.
Valsa eucalypti Cke. & Harkn., on twigs.

EUGENIA (MYRTACEAE)

EUGENIA spp. Tropical and subtropical evergreen trees native as far north as southern Fla., cult. there and in S. Calif. as ornamentals and for edible fruits especially E. AROMATICA Baill. (Caryophyllus aromatica L.), CLOVE-TREE; E. JAMBOLANA Lam., JAMBOLAN; E. JAMBOS L., MALABARPLUM; ROSE-APPLE; and E. MYRTIFOLIA Sims, AUSTRALIAN BRUSH-CHERRY.

Asterina colliculosa Speg. and A. myrciae Ryan, black leaf spot. P. R.
Asterinella cylindrotheca (Speg.) Theiss., black leaf spot. P. R.
A. puiggarii (Speg.) Theiss., Fla.
Asteridium eugeniae Mont., black leaf spot. P. R.
Botryosphaeria ribis Gross. & Dug. var. chromogena Shear et al., on branches.
Cephaleuros virescens Kze., algal spot. P. R.
Clitocybe tabescens (Scop. ex Fr.) Bres., root rot. Fla.
Colletotrichum gloeosporioides Penz., on leaves. Md.
Dictyochorina portoricensis Chard., black leaf spot. P. R.
Meliola hawaiiensis F. L. Stevens, black mildew. T. H. M. helleri Earle, P. R.
Melophia eugeniae Ferd. & Winge, on leaves. Virgin Is.
Pezizella oenotherae (Cke. & Ell.) Sacc., leaf spot. N. Y.
Phyllachora eugeniae Chard., P. semi-lunata (Chard.) Petr., P. verrucosa Chard., and P. whetzelii Chard., black leaf spot. P. R.
P. biareolata Speg., Virgin Is.
Phyllosticta eugeniae Young, leaf spot. P. R.
Puccinia psidii Wint., rust (II, III). P. R.
Rosellinia bunodes Berk. & Br., root rot. P. R.

EUONYMUS (CELASTRACEAE)

EUONYMUS spp. E. AMERICANUS L., STRAWBERRY-BUSH, and E. ATROPURPUREUS Jacq., BURNING-BUSH, WAHOO, -- deciduous shrubs of the Eastern, Central and Southern States; and E. OCCIDENTALIS Nutt., WESTERN BURNING BUSH, of the Pacific Coast. E. EUROPAEUS L., SPINDLE-TREE and other European spp. are cult. as ornamentals.

Cercospora euonymi Ell., leaf spot. Pa. to Wis. and Kan.
Coniothyrium fuckelii Sacc., on twigs. Calif.
Cytospora euonymi Cke., on twigs. Calif. C. foliicola Lib., on leaves.
Diplodia euonymi Westd. (?D. ramulicola Desm.), on twigs. Ala., La., N. Y.
Gloeodes pomigena (Schw.) Colby, on twigs. Ind.
Haplosporella euonymi Ell. & Ev., on branches. Nebr.
Marssonina thomasiana (Sacc.) Magn., leaf spot. Ohio to Wis. and Mo.
Microsphaera alni DC ex Wint., powdery mildew. N. J. to S. Dak. and southward. (Sometimes reported as M. euonymi (DC.) Sacc., which is not believed to occur in the U. S.)
Nectria cinnabarina Tode ex Fr., on branches. N. Y.
Otthia seriata (Pk.) Sacc., on dead branches. N. Y.
Phomopsis foveolaris (Fr.) Trav. (?P. ramealis Died.) on twigs. Ohio. (Conidial stage of Diaporthe laschii Nit.)
Phyllosticta euonymi Sacc., leaf spot. N. Y. to Miss. and Texas. P. pallens Ell. & Ev. (P. euonymi Tharp), Ind. to Gulf States.
Phymatotrichum omnivorum (Shear) Dug., root rot. Texas.
Physalospora obtusa (Schw.) Cke., on branches. Southeastern States.
Phytomonas tumefaciens (EFS.) Bergey, crown gall. Conn., N. J.
Ramularia euonymi Ell. & Kell., leaf spot. Iowa, Kans., Mo., Calif.
(Septogloeum thomasianum (Sacc.) Höhn.): Marssonina thomasianum.
Septoria atropurpurei Tehon, leaf spot. Ill. S. euonymi Rabh., Ind. Va.
Sirogloea euonymi Petr., on twigs. Calif.

EUONYMUS JAPONICUS L., EVERGREEN BURNING-BUSH. Evergreen shrub or small tree of Japan, widely cult. in Zone V and Southward. (A few other Asiatic spp. as E. ALATUS (Thunb.) Sieb. and E. BUNGEANA Maxim., cult. in the same range, are included.)

Cercospora destructiva Rav., leaf spot. Va. to Miss. and Texas.
Colletotrichum griseum Heald & Wolf, anthracnose. Gulf States, Ark.
Corticium koleroga (Cke.) Höhn., thread blight. La.
Exosporium concentricum Heald & Wolf, leaf spot. Va. to S. Car. and Gulf States.
Fusarium scirpi Lamb. & Fautr., foot rot. N. J.
Gibberella baccata (Wallr.) Sacc. (Fusarium lateritium Nees), on twigs. Calif.
Gloeosporium frigidum Sacc., anthracnose. Ark., La., Miss., Texas.
Glomerella cingulata (Ston.) Spauld. & Schrenk., on branches. Miss. Texas.

EUONYMUS--Continued

Heterodera marioni (Cornu) Goodey, root knot. Md.
Macrophoma (Diplodia) ramulicola (Desm.) Höhn., on branches. La.
Microsphaera alni DC. ex Wint., powdery mildew. Calif., Miss., N. J., Texas.
Oidium euonymi-japonici (Arc.) Sacc., powdery mildew. N. J., Iowa, Gulf States, Pacific Coast.
Pestalotia neglecta Thuem., on leaves. S. Car. P. planimi Vize. Calif., La.
Phyllosticta euonymi Sacc., leafspot. Miss., Va. P. pallens Ell. & Ev., Texas.
Phymatotrichum omnivorum (Shear) Dug., root rot. Ariz., Texas.
Physalospora ?obtusa (Schw.) Cke., on branches. Calif., Gulf States.
Phytomonas tumefaciens (EFS.) Bergey, crown gall. Miss., N. J., Texas.
Septoria euonymi Rabh., leaf spot. Miss., Va. S. euonymella Pass., S. Car.
Sirodesmium fumago (Cke.) Sacc., on leaves. S. Car.

EUONYMUS RADICANS Miq. (E. FORTUNEI (Turcz.) Hand.-Mazz. var RADICANS (Miq.) Rehd.), WINTERCREEPER. Trailing or climbing evergreen shrubs of China, cult. in a variety of horticultural forms up to Zone V.

Phytomonas tumefaciens (EFS.) Bergey, crown gall. Conn., Mich., S. C.

EUONYMUS VERRUCOSA SCOP.

Colletotrichum griseum Heald & Wolf, anthracnose. N. J., N. Y.

EUROTIA (CHENOPODIACEAE)

EUROTIA LANATA (Pursh) Moq., WINTERFAT. A small shrub of the Western plains.

Didymella eurotiae Fairm., on twigs. N. Mex.
Puccinia burnettii Griff., rust (O. I). Mont. and Wash. to N. Mex. III on Oryzopsis hymenoides.
P. eurotiae Griff., rust (III). Nev., Utah.

EXOTHEA (SAPINDACEAE)

EXOTHEA PANICULATA (Juss.) Radl., BUTTERBOUGH. Small tree of S. Fla.

Fomes extensus Lév. butt rot, heart rot. Fla.

EYSENHARDTIA (LEGUMINOSAE)

EYSENHARDTIA POLYSTACHYA (Orteg.) Sarg. (E. texana Scheele), KIDNEY-WOOD. Shrub or small tree of Growth Regions 10, 11, 17, 20.

Phymatotrichum omnivorum (Shear) Dug., root rot. Texas.

(Division of Mycology and Disease Survey.)